CLAIMS

What is claimed is:

1. A power generation system, comprising:

a fuel source to provide fuel;

a turbogenerator, coupled to the fuel source, to generate AC power;

a power controller, coupled to the turbogenerator, including an AC/DC power converter, said AC/DC power converter to convert said AC power generated by the turbogenerator to DC power on output lines to supply a DC load, said power controller to regulate the fuel to the turbogenerator, independent of a DC voltage on the output lines; and

a capacitor coupled across the output lines, said capacitor to source power to and/or sink power from the output lines, due to load changes by the DC load, to stabilize a DC voltage on the output lines.

2. The power generation system of claim 1 wherein the capacitor comprises at least one of the following: an electrochemical capacitor and a hybrid capacitor.

3. The power generation system of claim 2 wherein a voltage range of the capacitor is limited to a predetermined voltage range.

4. The power generation system of claim 1 wherein the capacitor is located internal to the power controller.

5. The power generation system of claim 1 wherein when an increase in the load is detected, the power controller increases the fuel to the turbogenerator to increase the DC power on the output lines.

6. The power generation system of claim 5 wherein when the DC power on the output lines is sufficient to match the increase in the load and recharge the capacitor, said power controller to reduce the fuel to the turbogenerator to match the load required by the DC load.

7. The power generation system of claim 1 wherein when a decrease in the load is detected, the power controller decreases the fuel to the turbogenerator to decrease the DC power on the output lines to match the load required by the DC load.

8. The power generation system of claim 1 wherein the turbogenerator includes a motor/generator and said AC/DC power converter comprises a bi-directional AC/DC power converter, said power controller, in a startup mode, to configure the bi-directional AC/DC power converter in a reverse direction to convert DC power of the capacitor to AC power to power the motor/generator.

9. The power generation system of claim 1 further comprising a battery controllably coupled across the output lines, under control of the power controller, to charge the capacitor.

10. The power generation system of claim 1 wherein the turbogenerator comprises:

a shaft;

a generator, coupled to the shaft, to generate the AC power;

a compressor, coupled to the shaft, to provide a supply of compressed air;

a combustor coupled to receive the supply of compressed air and the fuel, said combustor to combust the fuel and to provide exhaust gas;

a turbine coupled the shaft and coupled to receive the exhaust gas, said exhaust gas to flow through the turbine to control a rotational speed of the shaft; and

a recuperator including a high pressure side coupled between the compressor and the combustor, and a low pressure side coupled to receive the exhaust gas from the turbine.

11. The power generation system of claim 10 further comprising a temperature sensor coupled to the power controller and the turbine to sense a temperature, said power controller to vary the supply of fuel to the combustor to control the temperature, said control of the temperature being independent of the DC voltage on the output lines.

12. A power generation system, comprising:

a fuel source to provide fuel;

a turbogenerator, coupled to the fuel source, to generate AC power;

a power controller, coupled to the turbogenerator, including an AC/DC power converter and a DC/DC power converter, said AC/DC power converter to convert said AC power generated by the turbogenerator to DC power on a DC bus, said DC/DC power converter to convert the DC power on the DC bus to an output DC power on output lines to supply a DC load, said power controller to regulate the fuel to the turbogenerator, independent of a DC voltage on the DC bus; and

a capacitor coupled across the output lines, said capacitor to source power to and/or sink power from the output lines, due to load changes by the DC load.

13. The power generation system of claim 12 wherein the capacitor comprises at least one of the following: an electrochemical capacitor and a hybrid capacitor.

14. The power generation system of claim 12 wherein a voltage range of the capacitor is limited to a predetermined voltage range.

15. The power generation system of claim 12 wherein the capacitor is located internal to the power controller.

16. The power generation system of claim 12 wherein when an increase in the load is detected, the power controller increases the fuel to the turbogenerator to increase the output DC power on the output lines.

17. The power generation system of claim 16 wherein when the output DC power on the output lines is sufficient to match the increase in the load and recharge the capacitor, said power controller to reduce the fuel to the turbogenerator to match the load required by the DC load.

18. The power generation system of claim 12 wherein when a decrease in the load is detected, the power controller decreases the fuel to the turbogenerator to decrease the output DC power on the output lines to match the load required by the DC load.

19. The power generation system of claim 12 wherein the turbogenerator includes a motor/generator and said AC/DC power converter and said DC/DC power converter comprise a bi-directional AC/DC power converter and a bi-directional DC/DC power converter, respectively, said power controller, in a startup mode, to configure the bi-directional AC/DC power converter and the bi-directional DC/DC power converter in a reverse direction to convert DC power of the capacitor to AC power to power the motor/generator.

20. The power generation system of claim 12 further comprising a battery controllably coupled across the output lines, under control of the power controller, to charge the capacitor.

21. The power generation system of claim 12 wherein the turbogenerator comprises:

a shaft;

a generator, coupled to the shaft, to generate the AC power;

a compressor, coupled to the shaft, to provide a supply of compressed air;

a combustor coupled to receive the supply of compressed air and the fuel, said combustor to combust the fuel and to provide exhaust gas;

a turbine coupled the shaft and coupled to receive the exhaust gas, said exhaust gas to flow through the turbine to control a rotational speed of the shaft; and

a recuperator including a high pressure side coupled between the compressor and the combustor, and a low pressure side coupled to receive the exhaust gas from the turbine.

22. The power generation system of claim 21 further comprising a temperature sensor coupled to the power controller and the turbine to sense a temperature, said power controller to vary the supply of fuel to the combustor to control the temperature, said control of the temperature being independent of the DC voltage on the DC bus.

23. A power generation system, comprising:

a fuel source to provide fuel;

a turbogenerator, coupled to the fuel source, to generate AC power;

a power controller, coupled to the turbogenerator, including an AC/DC power converter and a first DC/DC power converter, said AC/DC power converter to convert said AC power generated by the turbogenerator to DC power on a DC bus, said first DC/DC power converter to convert the DC power on the DC bus to an output DC power on output lines to supply a DC load, said power controller to regulate the fuel to the turbogenerator, independent of a DC voltage on the DC bus; and

a capacitor controllably coupled, under control of the power controller, across the DC bus via a second DC/DC power converter to source power to and/or sink power from the DC bus, due to load changes by the DC load.

24. The power generation system of claim 23 wherein the capacitor comprises at least one of the following: an electrochemical capacitor and a hybrid capacitor.

25. The power generation system of claim 23 wherein the second DC/DC power converter steps up a terminal voltage of the capacitor to match the DC voltage on the DC bus.

26. The power generation system of claim 23 wherein at least one of the capacitor and the second DC/DC power converter is located internal to the power controller.

27. The power generation system of claim 23 wherein when an increase in the load is detected, the power controller increases the fuel to the turbogenerator to increase the DC power on the DC bus.

28. The power generation system of claim 27 wherein when the DC power on the DC bus is sufficient to match the increase in the load and recharge the capacitor, said power controller to reduce the fuel to the turbogenerator to match the load required by the DC load.

29. The power generation system of claim 23 wherein when a decrease in the load is detected, the power controller decreases the fuel to the turbogenerator to decrease the DC power on the DC bus to match the load required by the DC load.

30. The power generation system of claim 23 wherein the turbogenerator includes a motor/generator and said AC/DC power converter is bi-directional, said power controller, in a startup mode, to configure the AC/DC power converter in a reverse direction and the second DC/DC power converter in a forward direction to convert DC power of the capacitor to AC power to power the motor/generator.

31. The power generation system of claim 23 further comprising a battery controllably coupled across the capacitor, under control of the power controller, to charge the capacitor.

32. The power generation system of claim 23 wherein the turbogenerator comprises:

a shaft;

a generator, coupled to the shaft, to generate the AC power;

a compressor, coupled to the shaft, to provide a supply of compressed air;

a combustor coupled to receive the supply of compressed air and the fuel, said combustor to combust the fuel and to provide exhaust gas;

a turbine coupled the shaft and coupled to receive the exhaust gas, said exhaust gas to flow through the turbine to control a rotational speed of the shaft; and

a recuperator including a high pressure side coupled between the compressor and the combustor, and a low pressure side coupled to receive the exhaust gas from the turbine.

33. The power generation system of claim 32 further comprising a temperature sensor coupled to the power controller and the turbine to sense a temperature, said power controller to vary the supply of fuel to the combustor to control the temperature, said control of the temperature being independent of the DC voltage on the DC bus.

34. A power generation system, comprising:

a turbogenerator including a motor/generator and a turbine, said turbogenerator to generate AC power; and

a power controller, coupled to the turbogenerator, including an AC/DC power converter and a capacitor, said AC/DC power converter to convert said AC power generated by the turbogenerator to DC power on output lines to supply a DC load, said capacitor coupled across the output lines to source power to and/or sink power from the output lines due to load changes, said power controller to regulate a speed of the turbine, independent of a DC voltage on the output lines.

35. The power generation system of claim 34 wherein the capacitor is at least one of an electrochemical capacitor and a hybrid capacitor.

36. The power generation system of claim 34 wherein the AC/DC power converter comprises a bi-directional AC/DC power converter, said power controller, in a startup mode, to configure the bi-directional AC/DC power converter in a reverse direction to convert DC power of the capacitor to AC power to power the motor/generator.

37. The power generation system of claim 34 further comprising a battery controllably coupled across the output lines, under control of the power controller, to charge the capacitor.

38. A power generation system, comprising:

a turbogenerator including a motor/generator and a turbine, said turbogenerator to generate AC power; and

a power controller, coupled to the turbogenerator, including an AC/DC power converter, a DC/DC power converter, and a capacitor, said AC/DC power converter to convert said AC power generated by the turbogenerator to DC power on a DC bus, said DC/DC power converter to convert the DC power on the DC bus to an output DC power on output lines to supply a DC load, said capacitor coupled across the output lines to source power to and/or sink power from the output lines, due to load changes by the DC load, said power controller to regulate a speed of the turbine, independent of a DC voltage on the DC bus.

39. The power generation system of claim 38 wherein the capacitor comprises at least one of the following: an electrochemical capacitor and a hybrid capacitor.

40. The power generation system of claim 38 wherein the AC/DC power converter and said DC/DC power converter comprise a bi-directional AC/DC power converter and a bi-directional DC/DC power converter, respectively, said power controller, in a startup mode, to configure the bi-directional AC/DC power converter and the bi-directional DC/DC power converter in a reverse direction to pass energy stored by the capacitor to start the motor/generator.

41. The power generation system of claim 38 further comprising a battery controllably coupled across the output lines, under control of the power controller, to charge the capacitor.

42. A power generation system, comprising:

a turbogenerator including a motor/generator and a turbine, said turbogenerator to generate AC power; and

a power controller, coupled to the turbogenerator, including an AC/DC power converter, first and second DC/DC power converters, and a capacitor, said AC/DC power converter to convert said AC power generated by the turbogenerator to DC power on a DC bus, said first DC/DC power converter to convert the DC power on the DC bus to an output DC power on output lines to supply a DC load, said capacitor controllably coupled across the DC bus via the second DC/DC power converter, under control of the power controller, to source power to and/or sink power from the DC bus due to load changes by the DC load, said power controller to regulate a speed of the turbine, independent of a DC voltage on the DC bus.

43. The power generation system of claim 42 wherein the capacitor comprises at least one of the following: an electrochemical capacitor and a hybrid capacitor.

44. The power generation system of claim 42 wherein the AC/DC power converter is bi-directional, said power controller, in a startup mode, to configure the AC/DC power converter in a reverse direction and the second DC/DC power

converter in a forward direction to pass energy stored by the capacitor to power the motor/generator.